CS W186 Introduction to Database Systems
Fall 2019 Josh Hug

DIS 2

1 True and False

(a) When querying for an 16 byte record, exactly 16 bytes of data is read from disk.

No partial record readings.

a. F

(b) Writing to an SSD drive is more costly than reading from an SSD drive.

b. T

True, a write can involve reorganization

(c) In a heap file, all pages must be filled to capacity except the last page.

c. F

No such requirement.

(d) Assuming integers take 4 bytes and pointers take 4 bytes, a slot directory that is 512 bytes can address 64 records in a page.

d. 512/ 4 = 128 F

Free Space pointer does not FIT!

(e) In a page containing fixed-length records with no nullable fields, the size of the bitmap never changes.

e. T

True.

Which of the following are true about the benefits of using a record header for variable length records?

(a) Does not need a delimiter character to separate fields in the records

a. T

(b) Always matches or beats space cost when compared to fixed-length record format

b. F

(c) Can access any field without scanning the entire record

c. T

(d) Has compact representation of null values

d. T

2 Fragmentation And Record Formats

(a) Is fragmentation an issue with packed fixed length record page format?

a. F

(b) Is fragmentation an issue with variable length records on a slotted page?

b. T

Records are compacted upon deletion.

Delete a variable length record off a page and a spot is left open.

(c) We usually use bitmaps for pages with fixed-length records. Why not just use a slotted page for pages with fixed-length records?

Takes up morespace and there is no additional functionality in using a slotted page. Bitmap is space efficient.

3 Calculate the IOs

Assume we have a heap file A implemented with a page directory. One page in the directory can hold 16 page entries. There are 54 pages in file A in total.

(a) In the worst case, how many IOs are required to find a page with free space?

4 pages.

(b) In the worst case, how many IOs are required to write a record to a page with free space (assuming at least one free page exists)?

We need 4 I/Os to find the free page. 4+
We also have to read the free space. 1+
We also have to update the free space. 1+
Write to the page directory 1+
7 I/Os of operation